REMARKS

Reconsideration of the application in view of the above amendments and the following remarks is requested.

The Applicant has amended claims 4, 13, 18, 21, and 22 in order to better define the invention. In accordance with 37 CFR 1.121, the claims which are being currently amended are presented with markings to indicate the changes that have been made relative to the immediate prior version.

The amendments to the claims define the invention as including at least two constituent parts which are maintained under compression and also maintained substantially stationary relative to each other. Because of this, relative movement between the at least two constituent parts is precluded. Support for the amendments can be found in the specification at paragraphs 0028 and 0029, in which the importance of maintaining stiffness for stable machining conditions is emphasized.

Claim Rejections – 35 U.S.C. §103(a)

1. Claims 4, 9, 13, 17-18, 20, and 21-22

The Examiner indicated that claims 4, 9, 13, 17-18, 20, and 21-22 were rejected under 35 U.S.C. §103(a) as being unpatentable over U.S. Patent No. 4,413,938 (Kuczenski) in view of U.S. Patent No. 3,169,412 (Weeks).

The Examiner's comments regarding Kuczenski were, in part, as follows:

> Kuczenski teaches a machine tool including a spindle . . . including a plurality of shafts having gear pinions thereon . . .
>
> Kuczenski doesn't teach any sort of vibration dampening arrangement.

Also, the Examiner provided the following comments regarding Weeks:

> Weeks teaches a "component" in the form of a reduction gear pinion/shaft, which "component" includes "constituent parts" 3 and 6 (Figure 1, see also col. 4, lines 36-48, for example). Note that a "sheet" of "non-resilient" vibration damping material 8 (Figure 1, col. 2, lines 18-30) is sandwiched between the aforedescribed "constituent parts" (Figure 1) such that the damping material is considered to be located in a "slot" between the "constituent parts". Note also that bolts 7 extend through holes in the "constituent parts" and the damping material in order to fasten the "constituent parts" and the damping material together (see Figure 1 and col. 2, lines 3-17, for example). Note that the "component" is made of "metal" (col. 1, line 24) (such as a dense steel alloy per col. 4, lines 23-25, for example), and thus, by the nature of "metal" that would be able to survive the high forces associated with mating gears, the "constituent parts" are considered to be made of "substantially rigid material".

The Applicant notes that §706.02(j) of the Manual of Patent Examining Procedure includes the following:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure.

The Applicant submits that Kuczenski and Weeks do not teach or suggest all the limitations in the claims as amended. Accordingly, and in view of the excerpt from §706.02(j) set out above, the Applicant submits that the invention as defined in the enclosed claims is not obvious in view of Kuczenski and in view of Weeks.

Kuczenski discloses a spindle motor powered drawbar and is said to have the following object (col. 1, lines 38-41):

> . . . to provide a machine tool spindle in which the drawbar and spindle are rotatably driven from a single source of rotational energy.

Kuczenski appears to be directed to an arrangement including gears (col. 1, lines 52-59) and means for shifting gears (col. 1, lines 59-68, and col. 2, lines 1-2). Although Kuczenski describes the gears as being included in a "machine tool", that would appear to be used as a generic term in Kuczenski with no relevance to the Applicant's invention. In contrast to Kuczenski, in the Applicant's invention, two constituent parts forming part of a base or a column of a machine tool are maintained substantially stationary relative to each other.

Similarly, the Weeks patent is directed to damping vibration of a gear pinion, i.e., an elongate member with "a central portion defining herringbone teeth 1 and journal end portions 2, 3" (col. 1, lines 65-55). In use, the engagement of the pinion with a gear causes the vibration of the pinion (col. 2, lines 38-46):

> The pinion teeth 1 passing through the mesh point with the bull gear (not shown) impose vibration-inducing impulses at the middle of the rotor, which show up as objectionable noise unless appropriately damped. The vibrations generated by the gears are communicated to the journal end portion 3 and the vibration damper 4 effectively acts to absorb this vibration energy by reason of the relative motion, in a direction transverse

to the axis of the pinion, which is developed between the damping mass 6 and the journal end portion.

From the foregoing it can be seen that Weeks is directed to damping vibration of a moving part (i.e., the pinion) resulting from the engagement of the moving part with another moving part (i.e., the bull gear).

In contrast, and as emphasized by the amendments to claims 4, 13, 18, 21, and 22, the Applicant's invention is directed to two (or more) constituent parts (separated by the damping material) which are required to be maintained substantially stationary relative to each other so that machining can be done to the high degree of accuracy required. In the examples provided in the specification herein, the components (including the constituent parts) are included in a column or base of a machine tool (paragraphs 0021 – 0027). Each of the base and the column must be like a monolith (i.e., with respect to unity of structure) so that the accuracy of any machining function performed on the machine tool is not adversely affected. The Applicant's invention is directed to constituent parts of a base or a column which do not move relative to each other – in fact, it is very important that the constituent parts be maintained substantially stationary relative to each other in the Applicant's invention.

The Examiner has indicated that the Examiner considers the journal portion (3) and the damping mass (6) in Weeks to correspond to the constituent parts of the Applicant's invention. However, in Weeks, the journal portion (3) rotates, and the damping mass (6) is required to vibrate transversely in relation to the journal end portion (3). In the Applicant's invention, as noted above, the constituent parts must be maintained substantially stationary relative to each other.

The Applicant further submits that Weeks teaches away from the Applicant's invention. Weeks discloses a vibration damping device (4) (col. 1, lines 68-69) which includes the journal end portion (3) and a "mass" (6) respectively. Such elements, in the Examiner's

view, correspond to the "constituent parts" of the Applicant's invention. The damping device (4) is described in Weeks as including:

> . . . a disk member 6 having substantial mass and secured to the end face of the journal 3 by a plurality of circumferentially spaced bolts 7. A layer of vibration damping material is disposed between the mass 6 and the journal end portion 3. (col. 2, lines 3-7)

The mass (6) is described as being:

> free to vibrate transversely to the axis of the pinion to a limited degree, by reason of the substantial unsupported length of the bolts 7. (col. 2, lines 11-13)

Weeks discloses that transverse vibration of the mass (6) is necessary in order for the Weeks invention to function. The significance of the transverse vibration of the mass (6) is explained in the Weeks patent as follows (col. 2, lines 15-17):

> Such relative vibratory movement tends to impose shear forces on the vibration damping material 8. This is important, since vibration damping material is found to produce its maximum effectiveness when stressed in shear.

The importance of the vibration of the mass (6) is emphasized in Weeks at col. 2, lines 18-30, in which two different types of vibration damping materials are described, as follows (col. 2, lines 18–30):

> The vibration damping material 8 may be of any suitable form, for instance chromate-impregnated felt. . . . This vibration damping material may also be that sold by the Lord Manufacturing Company . . . which is a relatively soft epoxy-bonded material . . . These vibration damping materials are relatively stiff and have excellent vibration absorbing qualities when loaded in shear.

From the description of the two examples provided of vibration damping materials which would be suitable, it appears that the Weeks et al. invention requires a vibration damping material which is at least somewhat deformable. For example, felt is described in Marks' Standard Handbook for Mechanical Engineers (10^{th} ed.), at p. 6-140, as follows:

> A felt is a compacted formation of randomly entangled fibers. Wool felt is cohesive because the scaly structure of the wool fibers promotes mechanical interlocking of the tangled fibers. Felts can be made with blends of natural or synthetic fibers, and they may be impregnated with resins, waxes or lubricants for specific mechanical uses. Felts are available . . . in a wide range of thicknesses and densities for packing, for vibration absorption, for heat insulation, or as holders of lubricant for bearings.

Also, some suggestions as to the extent of the mass (6) are provided in Weeks. The recommendation for the mass (6) is that it should be "on the order of 5% of the weight of the entire rotor" (col. 2, lines 34-35). This is in marked contrast to the Applicant's invention, in which the constituent parts may be of substantially equal weight, or of widely differing weights.

The importance in Weeks of the vibration of the mass (6) relative to the journal end portion (3) is further emphasized in the following (col. 2, lines 42-51):

> The vibrations generated by the gears are communicated to the journal end portion 3 and the vibration damper 4 effectively acts to absorb this vibration energy by reason of the relative motion, in a direction transverse to the axis of the pinion, which is developed between the damping mass 6 and the journal end portion.
>
> The vibration damping effect of the mass 6 in FIG. 1, is, as noted above, a function of the weight of disk 6. Accordingly, FIG. 2 illustrates means for increasing the effective mass of the vibration damping member.

From the foregoing, it can be seen that the damping device (4) disclosed in Weeks requires that a mass (6) be capable of "relative vibratory movement" – i.e., transverse movement relative to the journal end portion (3) – which causes the vibration damping materials to have their "maximum effectiveness". In addition, Weeks teaches that a relatively thick layer of compressible material (i.e., felt, or a "soft" material, as in "a relatively soft epoxy-bonded material") is a suitable vibration damping material (especially if loaded in shear). This is very different from the very thin (0.01 inch to 0.02 inch) layer of hard material which is loaded in compression, in the Applicant's invention.

Accordingly, the Applicant submits that Weeks teaches away from the Applicant's invention, in which each constituent part is under compression and is maintained substantially stationary relative to each other. This can be seen in Fig. 3 and in paragraphs 0028 – 0029 of the Applicant's application, in which the importance of maintaining overall stiffness in the base and column (i.e., in order to permit machine tool functions to be performed to the high degree of accuracy required) of any particular component is emphasized.

The amendments to claims 4, 13, 18, 21, and 22 are intended to emphasize the difference between the Applicant's invention and the inventions disclosed in Kuczenski and in Weeks. Accordingly, the Applicant submits that Kuczenski in view of Weeks neither teaches nor suggests the invention as defined in claims 4, 13, 18, 21, or 22, as amended.

The Applicant further submits that claims 9, 17, and 20 (which are dependent on claims 4, 13, and 18 respectively) are not obvious in view of the cited references because, as indicated above, the amended independent claims are believed to be non-obvious. The Applicant therefore submits that Kuczenski in view of Weeks do not teach or suggest the invention as defined in claims 9, 17, or 20.

2. Claims 5-6, 14-15, and 19

The Examiner also indicated that claims 5-6, 14-15, and 19 were rejected under 35 U.S.C. §103(a) as being unpatentable over Kuczenski in view of Weeks.

The Examiner made the following comments regarding these claims:

> Weeks does not explicitly teach that the damping material is polyvinylchloride, and Weeks is silent as to the property of the permeability or lack thereof of the damping material.
>
> It is noted that Weeks does explicitly teach that the damping material may be of "any suitable form" (col. 2, lines 18-19).
>
> Examiner takes official notice that the use of polyvinylchloride in vibration dampening applications is notoriously well-known in the art. Examiner also notes that "substantial impermeability" is a property of such polyvinylchloride.
>
> It would have been obvious to one having ordinary skill in the art at the time the invention was made to have used whatever known damping material, such as polyvinylchloride, as was desired or expedient to an end user, based on any number of factors, such as cost and availability, since it has been held to be within the general skill of a worker in the art to select a known material on the basis of its suitability for the intended use as a matter of obvious design choice.

As noted above, the Examiner has taken official notice "that the use of polyvinylchloride . . . is notoriously well-known in the art". However, the Applicant submits that this factual assertion is not properly officially noted. The Applicant is not aware of polyvinylchloride being used as a damping material, particularly in a machine tool. As set out above, the Weeks reference discloses use of a relatively deformable material made of felt (or a "soft epoxy-bonded material") as a damping material. The Applicant requests

that the Examiner provide references showing the use of a relatively non-resilient material such as polyvinylchloride as a damping material.

The Applicant also submits that the officially noticed fact is not considered to be common knowledge or well-known in the art. In support, the Applicant submits the enclosed declaration of Eric G. Dahlin, P. Eng. In paragraph 3 of the enclosed declaration, Mr. Dahlin indicates that selection of a very thin sheet of polyvinylchloride is counterintuitive. Mr. Dahlin also states that "one skilled in the art would not ordinarily think of using a very thin sheet of PVC as a damping material". Based on this evidence, therefore, the Applicant submits that the officially-noticed fact is not common knowledge or well-known in the art.

3. Claim 22

The Examiner also indicated that Claim 22 was rejected under 35 U.S.C. §103(a) as being obvious over Weeks.

As indicated above, the Applicant submits that Weeks actually teaches away from the Applicant's invention. For instance, Weeks requires transverse vibration of a relatively large mass (6) (having approximately 5% of the rotor's weight – see col. 2, at lines 34-35), and Weeks also requires that a relatively deformable damping material be positioned between the rotor and the vibrating mass. In contrast, in the Applicant's invention, it is crucial that relative movement between constituent parts be virtually nonexistent (i.e., so that the components in which the constituent parts are included will be monolithic with respect to unity of structure), and the damping material must be hard and very thin, to limit the possibility of relative movement.

The Examiner also indicated that selecting a damping material with a thickness between approximately 0.01 inch and approximately 0.02 inch would be "obvious to one having ordinary skill in the art".

The Applicant submits that the use of a material as thin as the material used in the invention is not obvious to one skilled in the art, as one skilled in the art presumably would assume that a deformable material having a greater thickness (i.e., to enable it to absorb vibration) would be needed to dampen vibration, instead of a very thin layer (between 0.01 inch and 0.02 inch) of hard PVC material. In support of this, the Applicant submits the enclosed declaration of Eric G. Dahlin. In particular, paragraphs 3 and 4 of the enclosed declaration provide evidence in support of this submission.

No additional fees are due.

On the basis of the enclosed documents and the foregoing remarks, reconsideration of this application and its early allowance are requested. The Applicant's agent invites the Examiner to contact the Applicant's agent via telephone if the Examiner considers that a telephone conference would be of assistance in this matter.

Respectfully submitted,

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